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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1 53(b))

Attorney Docket	510554.95181
First Inventor	Sheri Lee Meyer
Title	System for Processing Interior Environment
Express Mail Label No.	EL562513454US

APPLICATION ELEMENTS

See MPEP Chapter 600 concerning utility patent application contents.

ADDRESS TO: **Commissioner for Patents, Box Patent Application, Washington, D.C. 20231**

1. [X] Fee transmittal Form (Submit an original and a duplicate for fee processing)
2. [ ] Applicant claims small entity status See 37 CFR 1.27.
3. [X] Specification [Total Pages 25] *(preferred arrangement set forth below)*
   - Descriptive title of the invention
   - Cross References to Related Applications
   - Statement Regarding Fed Sponsored R&D
   - Reference to sequence listing, a table or a computer program listing appendix
   - Background of the Invention
   - Brief Summary of the Invention
   - Brief Description of the Drawings *(if filed)*
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure
4. [X] Drawing(s) (35 USC 113) [Total Sheets 7]
5. Oath or Declaration [Total Pages 3]
   a. [X] Newly executed (original or copy)
   b. [ ] Copy from prior Application (37 CFR 1.63(d)) (for continuation/divisional with Box 17 completed)
      i. [ ] DELETION OF INVENTOR(S) Signed Statement attached deleting inventor(s) named in prior application, see 37CFR 1 63(d)(2) and 1 33(b)
6. [ ] Application Data Sheet. See 37 CFR 1.76
7. [ ] CD-ROM or CD-R in duplicate, large table or Computer Program (Appendix)
8. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)
   a. [ ] Computer Readable Form (CRF)
   b. *Specification Sequence Listing on*
      [ ] CD-ROM or CD-R (2 Copies); or
      [ ] paper
   c. [ ] Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. [X] Assignment Papers (cover sheet & documents)
10. [ ] 37 CFR 3.73(b) Statement (where there is an assignee) [ ] Power of Attorney
11. [ ] English Translation Document *(if applicable)*
12. [ ] Information Disclosure Statement (IDS)/PTO-1449 [ ] Copies of IDS Citations
13. [ ] Preliminary Amendment
14. [X] Return receipt postcard (MPEP 503) *(Should be specifically itemized)*
15. [ ] Certified copy of priority Document(s) *(if foreign priority is claimed)*
16. [ ] Other:

17. If a CONTINUING APPLICATION, check appropriate box and supply the requisite information: and in a preliminary amendment or in an Application Data Sheet under 37 CFR 1 76

[ ] Continuation [ ] Divisional [ ] Continuation-in-part (CIP) of prior application no. ____/____

Prior application information: Examiner: Group/Art Unit:

For CONTINUATION OR DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

18. CORRESPONDENCE ADDRESS

[ ] Customer Number or Bar Code Label (Insert Customer No. or Attach bar code label here) or [X] Correspondence address below

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Signature	George E Haas	Date: October 5, 2000	

Burden Hour Statement. This form is estimated to take 0 2 hours to complete Time will vary depending upon the needs of the individual case Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

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FEE TRANSMITTAL for FY 2000

Patent fees are subject to annual revision.

TOTAL AMOUNT OF PAYMENT | $876.00

Complete if Known	
Application Number	Not yet assigned
Filing Date	Herewith
First Named Inventor	Sheri Lee Meyer *et al.*
Group Art Unit	
Examiner Name	
Attorney Docket Number	510554.95181

METHOD OF PAYMENT (check one)

1. [X] The Commissioner is hereby authorized to charge indicated fees and credit any over payments to:

Deposit Account Number: 17-0055

Deposit Account Name: Quarles & Brady LLP

[X] Charge Any Additional Fee Required Under 37 CFR 1 16 and 1 17

[ ] Applicant claims small entity status See 37 CFR 1 27

2. [ ] Payment Enclosed:

[ ] Check [ ] Credit Card [ ] Money Order [ ] Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
101	710	201	355	Utility filing fee	710.00
106	320	206	160	Design filing fee	
107	490	207	245	Plant filing fee	
108	710	208	355	Reissue filing fee	
114	150	214	75	Provisional filing fee	

SUBTOTAL (1) ($)710.00

2. CLAIMS

		Extra		Fee from below		Fee Paid
Total Claims	27	-20**=	7	X 18	=	126 00
Independent	3	-3**=		X	=	0
Multiple Dependent Claims					=	

** or number previously paid, if greater, For reissues see below

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
103	18	203	9	Claims in excess of 20
102	80	202	40	Independent claims in excess of 3
104	270	204	135	Multiple dependent claim
109	80	209	40	**Reissue independent claims over original patent
110	18	210	9	**Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($)126.00

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for reexamination	
112	920	112	920	Requesting publication of SIR prior to Examiner action	
113	1,840	113	1,840	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	390	216	195	Extension for reply within second month	
117	890	217	445	Extension for reply within third month	
118	1,390	218	695	Extension for reply within fourth month	
128	1,890	228	945	Extension for reply within fifth month	
119	310	219	155	Notice of Appeal	
120	310	220	155	Filing a brief in support of an appeal	
121	270	221	135	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive unavoidably abandoned application	
141	1,240	241	620	Petition to revive unintentionally abandoned application	
142	1,240	242	620	Utility issue fee (or reissue)	
143	440	243	220	Design issue fee	
144	600	244	300	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Petitions related to provisional applications	
126	240	126	240	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	40 00
146	710	246	355	Filing a submission after final rejection (37 CFR 1.129(a))	
149	710	2496	355	For each additional invention to be examined (37 CFR 1 129(b))	
179	710	270	355	Request for Continued Examination (RCE)	
169	900	169	900	Request for expedited examination of a design application	

Other fee (specify) _____

* Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($)40.00

SUBMITTED BY				Complete (if applicable)	
Typed or Printed Name	George E Haas	Registration No. (Attorney/Agent)	27, 642	Telephone	414-277-5000
Signature	George E Haas			Date	October 5, 2000

SYSTEM FOR PROCESSING INTERIOR ENVIRONMENT COMPLAINTS FROM BUILDING OCCUPANTS

Background of the Invention

The present invention relates to facility management systems, such as those which control the environment within a building, and more particularly to systems by which building occupants can register complaints regarding operation of such systems.

Modern office buildings provide a sealed interior environment in that the windows can not be opened to allow outside air into the interior space. As a consequence, the air quality within the building is controlled solely by the heating, ventilation and air conditioning (HVAC) system. Unlike residential HVAC systems, the controls in commercial building are not directly accessible by the occupants, but rather only by facility management personnel.

As a consequence, if an occupant is uncomfortable, i.e. too cold, too hot or the air is stale, the individual must contact the building management in order to have the environmental control changed. In many office buildings a complaint by an individual occupant have to be relayed through several individuals before reaching a building engineer who has the authority and capability to adjust the HVAC system. Thus, it may take some period of time for the message to reach the building engineer and there is a potential for miscommunication.

Furthermore in a very large building the central contact person in the building management can receive complaints on a continuous basis at certain times, such as when there is a sudden change in outdoor air temperature. At those times the contact person may be fully occupied with answering telephone complaint calls and unable to perform other duties.

Summary of the Invention

The present invention provides a mechanism by which building occupants can submit facility complaints via an Intranet or Internet communication link. This system eliminates the need to have a person available at all times to receive the complaints. The complaint messages can be screened automatically and building management personnel alerted when certain conditions occur.

The occupant complaints are handled by an Intracomfort system that is connected to a communication network which is accessible by the building occupants. For example, the communication network may be the Internet or may be part of an Intranet in the building. A message processing system is coupled to the communication network to receive the complaint messages generated by building occupants. The message processing system stores information about each complaint and the stored information is accessible by building management personnel.

In the preferred embodiment, the message processing system contains a predefined message filtering criterion which is applied to received complaint messages. A warning is generated when the received complaint messages satisfy the message filtering criterion. The warning is sent to the building management personnel. For example, the message filtering criterion may specify a number of complaint messages that must be received from a given area of the building within a specified interval of time before a warning is generated. In other situations the filtering criterion specifies a class of building occupants and any message from an occupant in that class generates a warning.

A display device, such as a computer workstation for example, is coupled to the server for presenting the warning and other complaint information to management of the building.

Brief Description of the Drawings

FIGURE 1 is a block diagram illustrating the architecture of an IntraComfort system according to the present invention;

FIGURES 2 and 3 depict displays on a screen of a computer workstation which interfaces with the IntraComfort system;

FIGURES 4A and 4B form a flowchart of the process performed by an Internet/Intranet web site through which building occupants interface with the IntraComfort system;

FIGURE 5 is a flowchart of a complaint processing method performed by software which receives a occupant supplied information from the Internet/Intranet web site;

FIGURES 6 and 7 show exemplary graphical reports which tabulate complaints received by the system; and

FIGURE 8 represents a display of complaint information is a table.

Detailed Description of the Invention

Personal comfort in any working environment is a key factor to productivity and quality work products. If employees are physically uncomfortable, they may become distracted by the discomfort, thus lowering their level of concentration. As a consequence, proper control of a workplace environment is very important.

Relatively large commercial buildings are divided into a plurality of control zones, referred to herein as "comfort areas", with independently controllable environmental conditions. For example, each control zone may have a separate variable air volume (VAV) unit that recycles the interior air and heats or cools that air as needed to maintain the desired environment. The VAV unit also can replace some of the recycled air with air drawn in from outside the building thus preventing the interior air from becoming stale. The operation of the VAV unit and other components of the HVAC system are individually controlled by the building management.

The present invention provides an "IntraComfort System" which enables occupants of a building to indicate their level of comfort in their work area by means of an Intranet browser based interface. This provides automated collection and generation of building area comfort information for use by the building operators and managers in improving occupant comfort. Through this system, building occupants become active "users" of their work environment. Furthermore, the performance of building control systems can be determined more accurately through actual user feedback, rather than solely through sensing environmental parameters. This expanded insight into occupant comfort diminishes complaint telephone calls, thereby reducing the amount of time a building operator spends handling comfort complaints.

With reference to Figure 1, the IntraComfort System 10 acts as a, Intranet/Internet web site on a computer network 14 and comprises three principal components, a IntraComfort Web site 11, a Complaint Agent 12, and a Compliant Analyst 13. The first two components reside on a Windows NT® based system server 16 connected to the computer network 14 via a Web server 18.

The IntraComfort Web site 11 is a conventional Intranet web site that is configured to enable building occupants to view information about present environmental conditions and enter complaints via personal computers 26, which execute a standard Internet browser thereby acting as an Intranet client. If a single tenant occupies the entire building, the IntraComfort System can be implemented as an Intranet site on that tenant's local area network 14. In multi-tenant buildings, the IntraComfort System 10 can utilize the Internet, in place of the computer network 14. Thus the terms Internet and Intranet are used interchangeably with respect to the present invention.

The IntraComfort Web site 11 comprises a combination of HTML, ASP, and image files which present information about

the building environment and which provide templates for occupants to enter complaints and comments. The clients of the IntraComfort Web site, i.e. the building occupants, use dynamic HTML enabled Internet browsers running on their personal computers 26 to view the site content via an Intranet connection provided by the ASP enabled Web server 18. The access is similar to the operation of a standard Internet site. Complaints and comments received by the IntraComfort Web site 11 are passed to the Complaint Agent 12. The Complaint Agent 12 acts as a mediator between the IntraComfort Web site 11 (the building occupant interface) and the Complaint Analyst 13 (the building operator interface). The primary responsibilities of the Complaint Agent 12 are handling all incoming occupant submissions received via the IntraComfort Web site 11 and generating comfort notices based on those submissions. Secondary responsibilities of the Complaint Agent 12 relate to handling operator-authored notices about the system or a given comfort area for posting to the IntraComfort Web site.

The Complaint Agent 12 is divided into two communication interfaces, a Response Handler 70 and a Notice Handler 72. The Response handler 70 logs all occupant generated comfort complaints along with appropriate building control system environmental data. A storage device 24, such as a hard drive, is provided in the system server 16 to store the complaints and comments gathered from building occupants. The Response handler 70 also logs requests from occupants to be added to the IntraComfort system. This software component also processes requests from the building operator (via the Complaint Analyst 13) to post web page notices for a specific comfort area or the building in general.

Upon receiving a complaint the Response Handler also determines whether the nature of a complaint warrants sending a notice to the building operator, in which case the Notice Handler 72 is advised of that event. The conditions for

generating a notice are defined in the system configuration file. For example if the number of complaints received within a defined period of time exceeds a given amount, a warning message is sent to the Complaint Analyst 13 running on a building operator's workstation 28, which typically is a personal computer with a keyboard and display screen. The Complaint Analyst 13 software component, which runs on that workstation 28, handles the notices and produces reports and statistical summaries of the complaints for review by the building management, as will be described. All information logged by the Response handler 70 is able to be accessed by the building operator through the Complaint Analyst 13. Each log entry contains the date and time that the notice threshold was reached, where the condition occurred (Comfort Area or system in general), and an identification of the condition.

The system server 16 also includes another communication server 20 which interfaces to a communication bus of the HVAC building control system 22, such as a Metasys® Building Automation System produced by Johnson Controls, Inc. of Milwaukee, Wisconsin, U.S.A. The interface with the building control system 22 enables the Intracomfort system 10 to gather current values for temperature, humidity and other environmental parameters throughout the building.

As noted previously, the operation of the Intracomfort system 10 is defined by configuration data entered by the building operators via workstation 28. The configuration data fall into several categories, for example building comfort areas and occupant profile. Each category of configuration data is stored in a separate table in the storage device 24. The building comfort area data specify, for each comfort area, the particular environmental conditions on which the building occupants are able to provide feedback. These conditions include environmental parameters such as temperature, humidity, and air quality.

When an occupant accesses the Intracomfort system, only the conditions designated in the configuration data of the comfort area associated with that occupant will be logged. However, the occupant always is able to submit a written comment. The comfort area configuration also designates what environmental information will be displayed to the building occupants. This information can include the current values for temperature and humidity of the inquiring occupant's working area, and outdoor temperature and humidity values.

The Intracomfort system 10 also can enable a building occupant to turn-on the automatically controlled lighting in the respective work area and this function is enables or disabled by the system configuration. Upon entry, the configuration information is tabulated by the complaint analyst 13 and sent to the storage device 24.

The configuration database also contains a profile of information about each building occupant who may access the Intracomfort system 10. That profile contains a unique occupant identifier which each person utilizes when accessing the system and can be the full name of the individual, a network user name or another designation created by the building operator. Each occupant profile contains a designation of a comfort area within the building in which the person works. As noted previously, a comfort area corresponds to one of the zones in the building for which the environment can be separately controlled. For example depending on the HVAC system, the comfort area may be an entire floor of the building or a designated section of a floor.

A priority level may be assigned to each occupant with that assignment being stored in the person's profile. As will be described, the processing of complaints can be based on the priority level of the occupant submitting the complaint. With complaints from higher priority level individuals receiving greater attention.

If the building control system 22 is able to operate the lights in the given comfort area, the ability for occupants to control the lights through the IntraComfort system 10 also may be enabled in the configuration data. For this function a designation of the bank of lights for the occupant's work area is specified. Note that the lighting bank may not be coextensive with the comfort area. As will be described, the occupants may only turn on comfort area lighting, but cannot turn it off. Only the building control system 22 program can deactivate building lights.

The occupant profile also includes information such as persons's phone number, mailing address, or email address to enable the building management to contact that occupant. The workstation executes software, referred to herein as the Complaint Analyst, which displays the occupant profile on the screen of the workstation in a number sort orders. For example, the profiles can be displayed in alphanumeric order by the operator identifier, in comfort area order, or by lighting area. The user profiles are stored by the workstation 28 on the storage device 24 of the IntraComfort system server 16. Once the Intracomfort system 10 has been configured, it can be placed into operation.

With reference to Figures 1 and 4A, when a particular occupant logs onto the Intracomfort web site 11, the web server 16 attempts to read a "cookie" from the web browser of the occupant's personal computer 26 at step 30. Web site commonly store cookies into the accessing personal computer and the cookies contain information useful to the web site on subsequent visits by that user. In this case, the presence of a cookie in the computer indicates that the occupant previously visited the IntraComfort web site and most likely has a profile stored in the system. Therefore, if a cookie is not found at step 32, the process branches to step 33 at which the Intracomfort web site 11 sends the occupant's personal computer a page that contains a form by which the

occupant can log into the system, request to be added as a user, or query the system to find a previously assigned log-in identifier. The occupant fills out the form and returns the data to the Intracomfort web site 11.

At step 34 the Intracomfort web site 11 inspects the data to determine whether the occupant is requesting to be added as a new occupant. If so the procedure branches to step 35 at which the request and other form data is sent in a message to the building operator workstation via the complaint agent 12. The building operator responds to such requests from occupants seeking the be added as a system user by entering the supplied data into the occupant profile database in storage device 24.

If a request to add a new occupant was not received, the procedure branches to step 36 where web site 11 determines whether the occupant has submitted log-in information. If that is the case and the log-in information is authentic, the processing jumps to step 40. If an authentic log-in was not received, the web site 11 determines at step 37 whether the person accessing the web site seeks to locate an occupant identifier that was previously stored in a table in storage device 24. If so, the person is sent a web page requesting information that enables the system to find the log-in information at step 38. If that user submitted information does not allow the system to find the log-in information in the storage device 24, the process return to step 38 to request more information.

Once the occupant has been properly identified to the Intracomfort web site 11, the associated occupant profile is read from the storage device 24 at step 40 and saved as a cookie on the person's personal computer 26 at step 41. The process then advances to step 42.

Thereafter when this person accesses the Intracomfort web site 11, a cookie containing the occupant profile will be read from the personal computer for that person. Therefore, the process will branch from step 32 immediately to step 42.

That occupant profile from the cookie identifies the comfort area associated with the accessing occupant and enables the configuration data for that comfort area to be read from a database in storage device 24. The web site 11 then utilizes the building control system server 20 at step 44 to contact the building control system 22 and obtain information regarding the current conditions of the comfort area.

The gathered information then is used to fill in the IntraComfort web site homepage at step 45. Figure 2 depicts an exemplary web site's homepage in which the comfort area and its current environment conditions are indicated in the upper right section. Additional sections along the right of the homepage contain general building and area specific comments that the building operator has loaded into the Intracomfort web site 11 as messages for the occupants.

A web page frame 29 along the left side of the homepage provides a menu of items from which the occupant may select. The button labeled "Current Conditions" causes the display of the environmental data to be refreshed. Other menu items identify an environmental condition about which the occupant desires to provide feedback to the building operator. By clicking a button to the left of a particular menu item the occupant can select an item.

Depending upon which item is selected, the menu in web page frame 29 expands vertically to provide additional information related to that selection. For example, Figure 3 illustrates the screen for entering a complaint about the temperature within the comfort area. Specifically web page frame 29 has an expanded section under the heading "Temperature Feedback" with additional buttons on which the occupant may click to indicate the nature and intensity of the temperature discomfort from among the selections of hot, warm, cool, or cold. Alternatively, the user can scroll downward through web page frame 29 on the page (Figure 2) to

enter a complaint on other environmental conditions, such as humidity or air quality, as well as to submit a written comment. Other menu items enable the occupant to turn on lights in the work area or preform other functions of the Intracomfort System 10. After the occupant makes a menu selection, the personal computer 26 transmits a message with the selected information to the system server 16 at step 45.

When the IntraComfort Site 11 receives the response from the occupant, a determination is made which menu item was selected. With reference to Figure 4B, a determination is made at step 46 whether the user terminated the session in which event the communication with the occupant's computer ends. Otherwise the process advances to step 48 to determine whether the user selected the Identification menu item. If that is the case, the procedure goes to step 49 where the IntraComfort web site 11 sends a new web page frame 29 to the personal computer 26 which contains sub-items under the Identification heading. Those sub-items enable the occupants to update their profiles, indicate that they have moved within the building, or manually log-in as described previously.

When the response information to the new menu frame 29 is sent back from the personal computer 26, the Intracomfort web site 11 determines at step 59 whether the occupant desires to update his profile. In that case the process branches to the update routine. Other wise at step 51 a determination is made whether the occupant has wishes to indicate a building move so that the proper comfort area and lighting bank will be listed in the occupant profile. This is done by the building operator, who now is informed of the move. Finally at step 52, a decision is made whether the accessing occupant desires to manually log-in. After an occupant moves to an different area in the building, the cookie information in the personal computer no longer may be valid and the occupant may have to override the automatic

log-in via the cookie with a manual log-in. In another situation, an occupant may use the personal computer of another occupant to enter a complaint. In this case, the initial log-in uses the profile of that other occupant that was obtained from the cookie in the computer. Thus the occupant accessing the system has to log-in manually so that his profile information will be used in registering the complaint.

Back at step 48 if the Identification menu item was not selected the processing advances to step 53. If the occupant's response to the Home Page at step 44 designated that the lights in the work area should be turned on, that event is detected at step 53 where the process branches to step 54. At this juncture, the Intracomfort web site 11 executes a routine which formulates a message which is sent to the response handler 70 to turn on the lights and an indication of the lighting group to be activated. That message is sent to the building control system server 20 (Figure 1) which then communicates the information to the building control system 22 causing the latter component to activate the designated section of the building lighting.

At step 56 a determination is made by the Intracomfort web site 11 whether the occupant selected the button designated for entering a written comment. If so the user input web page for a comment is sent to the occupant's personal computer at step 58. Upon receipt, Intracomfort web site 11 forwards the comment to the response handler 58 which logs the information into a storage location of device 24. The building operator is able to access this log via the workstation 28 and read the comments stored therein.

If one of the complaint buttons associated with an environmental condition was selected as determined at step 60, the process advances to step 62 where the Web site interprets the complaint data and formulates a message containing the complaint. That message specifies the

occupant's identifier, the associated comfort area and the complaint, for example that the temperature is too hot. Alternatively, the complaint could indicate that the humidity in the area was too dry or too humid, or that the air quality was stuffy, stale, drafty, dusty or there was an unusual odor. At step 64, this message is sent by the Intracomfort web site 11 to the Complaint Agent 12 and, specifically, to the response handler 70. An acknowledgment of the complaint receipt is sent back to the originating personal computer at step 66.

With reference to Figure 5, when the response handler 70 receives a message from the Intracomfort web site 11, the message is date and time-stamped at step 80. Then a determination is made at step 82 whether the message contains a comment or a complaint. When a comment is received, it is logged into a comment table in the storage device along with the current environmental conditions of the associated comfort area at step 84. When a complaint is received, the response handler 70 examines the message by extracting the occupant's identifier at step 86 which then is used to access a complaint log within storage device 24 to determine the last time that this occupant submitted a complaint. The response handler 70 implements a temporal filter which prevents a given occupant from repeatedly submitting complaints within a relatively short interval of time. This filtering not only prevents a person from becoming a nuisance but also permits the HVAC system to respond to the complaint before the individual can submit a similar complaint. The building operator performs a variety of functions and is not continuously monitoring for complaints. Even once the operator adjusts the building control system 22 in response to a complaint, the HVAC system cannot change the environment instantaneously. For example it may take thirty minutes or more for the HVAC to produce a change in the temperature after receiving a command, depending upon the magnitude of

the change and the size of the comfort area. Therefore at step 86, the IntraComfort system determines whether a predefined interval of time, designated X, has elapsed since the previous complaint from this occupant. If that is not the case, a wait indication is returned to the web page denoting to the occupant that a complaint can not be submitted until the interval expires. Comments are entered into the system database without checking the interval.

If the user has not sent a complaint recently, the process implemented by the response handler 70 advances to step 90 at which the response handler 70 formulates a log entry for the complaint and stores that information in a complaint log contained on storage device 24. As will be described, the building operator via the workstation 28 is able to access this log and scroll through the complaints listed therein.

Then the response handler assesses whether the present complaint warrants sending a special notice to the building operator workstation 28. The determination of whether the complaint is significant is based on criteria specified during configuration of the IntraComfort System 10 and alterable thereafter by the building operator via workstation 28. In the preferred embodiment, there are three different criteria from which the building operator may select and any combination of one or more criteria may be active in a particular system.

The first criterion specifies either that all complaints or specifically designated types of complaints will generate a notice to the operator. For example, the operator may want to be notified immediately of all temperature and air quality complaints, but not for other complaints. The second criterion produces notices from complaints submitted by an occupant who has been assigned a priority level equal to or greater than a designated value. For example, department managers and higher supervisory personnel may be assigned

priority levels of 50 or higher and complaints from those persons will generate a building operator notice. Complaints received from personnel with lower priority levels merely will be placed in the complaint log. This priority criterion also can be utilized to generate notices from facility management personnel and security officers. The third criterion generates notices when the number of specific types of complaints from a comfort area exceeds a given number within a moving window of time. For example, a notice will be sent to the building operator when the number of complaints that an area is too cold exceeds five within in a moving one hour period of time. Configuration data specifying which of the three criteria are active and the complaint filtering requirements for each criterion are stored within a data table utilized by complaint agent 12.

The assessment of whether receipt of the current complaint necessitates generation of an operator notice commences at step 92. Here, the complaint is examined to determine whether it fits within the first criterion, that is whether it is the designated complaint type. If all complaints are to generate a notice or the complaint fits within a specified category of complaints, the program execution branches to step 98. If the first criterion is not satisfied the program execution branches instead to step 94 for the second criterion. At this point, the occupant identifier in the complaint is utilized to access the occupant profile database in device 24 and read the priority level of the complainer. If the complainer meets the priority level threshold, the procedure branches to step 98, otherwise the process goes to step 96. The response handler 70 accesses the complaint log to count the complaints which satisfy the specifies notice criteria, i.e. is the particular complaint type from the comfort area of the present complaint and received within the designated interval of time. Upon advancing to step 97 the new count value is compared to the

respective operator defined threshold to ascertain whether the requisite number of complaints of that type have been received within the specified time interval. If that criterion is satisfied, a branch to step 98 occurs, otherwise the complaint handling process terminates.

At step 98, the response handler 70 formulates a message containing the type of notice to be presented to the building operator. This message is transmitted to the notice handler 72 within the complaint agent 12. The message contains all of the pertinent information which will allow the notice handler to prepare the proper notice to the building operator and log that information into a notice table in the database maintained in storage device 24. The Complaint Analyst 13 displays a table of notices to the building operator.

The building operator can acknowledge and delete specific notices on the workstation 28 by clicking on appropriate command buttons appearing in the complaint analyst. Acknowledging a complaint notice sends a reply message to the notice handler 72 which responds by setting an acknowledgment flag in the respective entry in the notice log. If the building operator deletes the complaint message, the corresponding entry in the notice log also is deleted by the notice handler 72.

With reference again to Figure 1, the complaint analyst 13 running on the operator workstation 28 provides an interface to the system server 16 on which the Intracomfort web site 11 and the complaint agent 12 reside. This enables the building operator, via the workstation 28, to configure the functions of and supply other data to the Intracomfort System 10, in addition to receiving the notices posted by the complaint agent 12. The complaint analyst 13 also is employed to generate comfort reports and display complaint summaries via the operator workstation 28. In addition the complaint analyst provides feedback to the occupants by

entering comfort area or building wide comments that are displayed on the web site.

Configuring the Intracomfort system server 16 and its constituents, such as the Intracomfort web site 11 and the complaint agent 12, is implemented using standard techniques. Specifically, a configuration screen is presented on the operator's workstation 28 for each element that needs to be configured. Such screens contain fields for the parameters which need to be defined and each field may have a pull down menu of entry choices. Alternatively, the operator is permitted to type in a particular entry. Control buttons are presented on the configuration screen to save, clear and perform other command functions which manipulate the configuration data.

The building operator also utilizes the complaint analyst 13 to view and maintain all occupant submitted complaints, comments and requests along with the notices that are produced by the notice handler 72. Principal to the complaint analyst 13 are interactive views of comfort complaints and notices in a grid-based format, in addition to reports of the comfort information in tabular and graphical formats. The interactive representations allow the operator to acknowledge complaints that have been serviced, enter service comments, delete complaints and notices from their respective logs, and look up occupant information relevant to a resubmitted complaint.

The comfort reports display a collective or a subset view of comfort complaints, notices or comments. The report generation is similar to that conventionally used in databases to allow the user the ability to formulate a query specifying value ranges for the data being sought and then utilize those specified ranges to select entries from the databases and logs contained in storage device 24. The culled information then is presented to the user in a predefined report format. The operator is able to design and

store various formats to use in generating periodic reports from the Intracomfort System 10.

For example, Figures 6 and 7 illustrate a pair bar graphs which can be created to display complaint information. Specifically, Figure 6 shows the number of complaints related to temperature, humidity and air quality conditions that were received for each comfort area. In this exemplary display, the second floor has an higher than average number of complaints with respect to temperature. Figure 7 illustrates the complaint volume for one comfort area and the number of each type of complaint within each environmental condition. These types of bar graphs enable the building management to easily perceive an overview of the complaint generation and ascertain problem areas that may exist.

Figure 8 depicts the display of the complaint log on the operator workstation and also corresponds to the format of the data structure used to store the log of complaint information in the storage device 24.

CLAIMS

What is claimed is:

1. In a facility management system, an apparatus by which an occupant of a building submits a complaint, said apparatus comprising:

a communication network which is accessible by the occupants to transmit complaint messages;

a message processing system coupled to the communication network to receive the complaint messages, the message processing system containing a predefined message filtering criterion which is applied to received complaint messages and generating a warning when the received complaint messages satisfy the predefined message filtering criterion; and

a display device coupled to the server and presenting the warning to management of the building.

2. The apparatus as recited in claim 1 wherein the predefined message filtering criterion specifies a given number of complaint messages which must be received in order for a warning to be generated.

3. The apparatus as recited in claim 1 wherein the predefined message filtering criterion specifies a given number of complaint messages which must be received within a defined interval of time in order for a warning to be generated.

4. The apparatus as recited in claim 1 wherein the predefined message filtering criterion specifies an occupant characteristic, and the warning is generated upon receipt of a complaint message from occupants possessing that characteristic.

5. The apparatus as recited in claim 1 wherein the predefined message filtering criterion specifies a class of occupants, and the warning is generated upon receipt of a complaint message from an occupant in that class.

6. The apparatus as recited in claim 1 wherein the predefined message filtering criterion specifies a given area of the building and the warning is generated upon receipt of a complaint message from that area.

7. The apparatus as recited in claim 1 wherein the message processing system inhibits generation of a warning when a plurality of complaint messages are received from the same occupant within a predefined interval of time.

8. The apparatus as recited in claim 1 wherein the message processing system further comprising a storage device which retains information related to the received complaint messages.

9. The apparatus as recited in claim 8 wherein the display device also presents the information related to the received complaint messages that has been stored in the storage device.

10. The apparatus as recited in claim 1wherein the message processing system comprises a server which forms an Intranet site on the communication network.

11. In a facility management system for a building that has a communication network which is accessible by occupants of the building, an apparatus by which the occupants submit complaints regarding an operating condition of the building, said apparatus comprising:

a storage device containing a log for complaints received from the occupants;

a web site connected to the communication network and to the storage device, wherein upon being contacted by an occupant the web site replies with a web page for submitting a complaint regarding an operating condition of the building, the web site also receives complaint messages from such an occupant via the communication network;

a complaint agent connected to the web site to receive complaint messages therefrom and connected to the storage device, the complaint agent storing received complaint messages into the log in the storage device; and

a workstation coupled to the storage device to obtain and present information from the log to building management personnel.

12. The apparatus as recited in claim 11 wherein workstation comprises a complaint analyst which processes data received from the complaint agent and the storage device and formulates displays of that data for presentation to the building management personnel.

13. The apparatus as recited in claim 11 wherein the data structure also contains information that for each occupant identifies an area of the building and the web site associates each complaint message received with the area of the building identified for the occupant who sent the complaint message.

14. The apparatus as recited in claim 11 wherein the complaint agent logs environmental conditions with the complaint.

15. The apparatus as recited in claim 11 wherein the web site customizes the web page according to the area of the building identified for an occupant who contacted the web site.

16. The apparatus as recited in claim 15 wherein the web site customizes the web page with specific operating conditions defined for the area of the building identified for the occupant who contacted the web site.

17. The apparatus as recited in claim 11 wherein the complaint agent applies a filtering criterion to received complaint messages and generates a warning when the received complaint messages satisfy the filtering criterion; and the workstation presents the warning to building management personnel.

18. The apparatus as recited in claim 11 wherein the complaint agent applies a filtering criterion to received communication network messages and generates a warning when the received complaint messages satisfy the filtering criterion.

19. The apparatus as recited in claim 18 wherein the complaint agent inhibits generation of a warning when a plurality of complaint messages are received from the same occupant within a predefined interval of time.

20. The apparatus as recited in claim 11 wherein the complaint agent generates a warning in response to a given number of complaint messages being received.

21. The apparatus as recited in claim 11 wherein the complaint agent generates a warning in response to a given number of complaint messages being received within a defined period of time.

22. The apparatus as recited in claim 11 wherein the complaint agent contains a message filtering criterion which specifies an occupant characteristic and the complaint agent generates a warning upon receipt of a complaint message from occupants possessing that characteristic.

23. The apparatus as recited in claim 11 wherein the complaint agent generates a warning in response to receipt of a complaint message from a predefined area of the building.

24. In a facility management system, an apparatus by which occupants of a building submit complaints regarding an operating condition of the building, the building having a communication network which is accessible by the occupants, said apparatus comprising:

a storage device containing a log of complaints received from the occupants;

a web site connected to the communication network and to the storage device, wherein upon being contacted by an occupant the web site replies with a web page for submitting a complaint regarding an operating condition of the building, the web site also receives complaint messages from such as occupant;

a complaint agent connected to the web site to receive complaint messages therefrom and connected to the storage device, the complaint agent storing received complaint messages into the log in the storage device, the complaint agent applies a filtering criterion to received complaint messages and generating a warning when the received complaint messages satisfy the filtering criterion; and

a workstation coupled to the complaint agent to receive and present the warning to building management personnel.

25. The apparatus as recited in claim 24 wherein the workstation presents building management personnel with information that was stored in the log in the storage device.

26. The apparatus as recited in claim 24 wherein the filtering criterion applied by the complaint agent inhibits a plurality of complaint messages sent by one occupant within a given interval of time from causing generation of a warning.

27. The apparatus as recited in claim 24 wherein the complaint agent logs environmental conditions with the complaint.

Docket No. 60030.0096US01

Abstract of the Disclosure

Occupants of a building are able to submit complaints regarding operating conditions, such as temperature, humidity and air quality, via a web site on an Intranet or Internet. The server for the web site logs the complaints and current environmental conditions in a storage device. The server also applies a filter criterion to each complaint and when the complaints satisfy the filter criterion a warning is sent to building management personnel. This filtering process enables the building management personnel to be alerted when the number of complaints exceeds a given number or when specific classes of occupants submit a complaint.

D95/0005 - 0005

US 6,965,376 B2

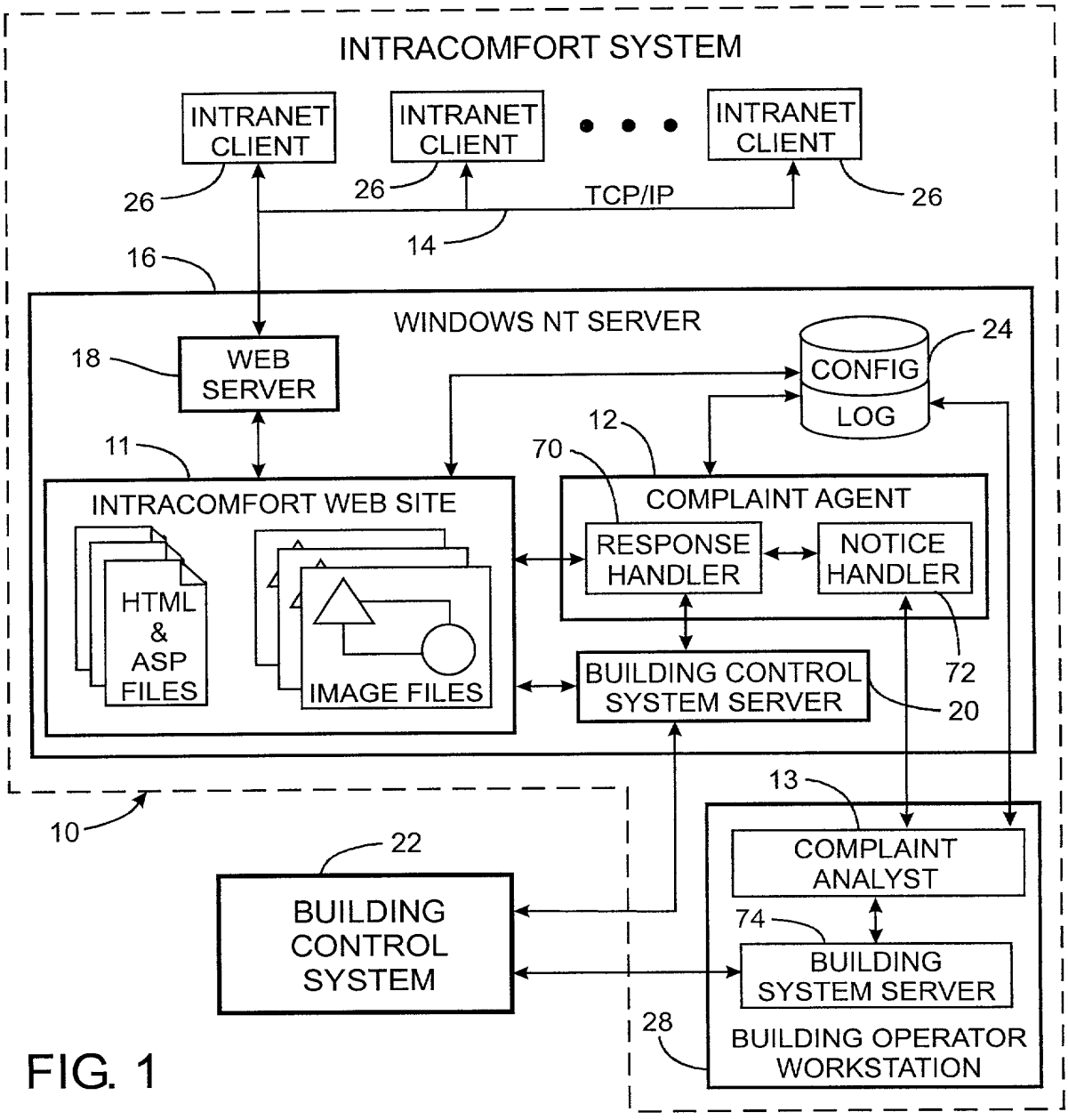

FIG. 1

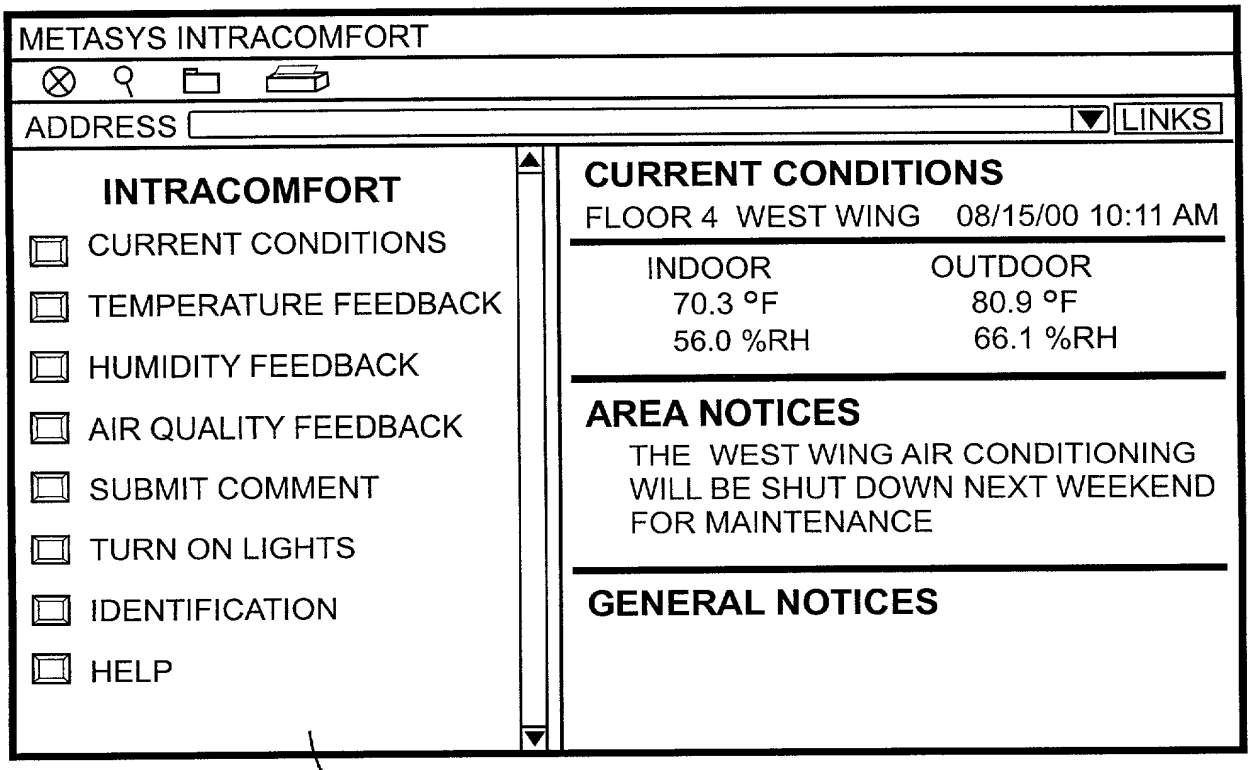

FIG. 2

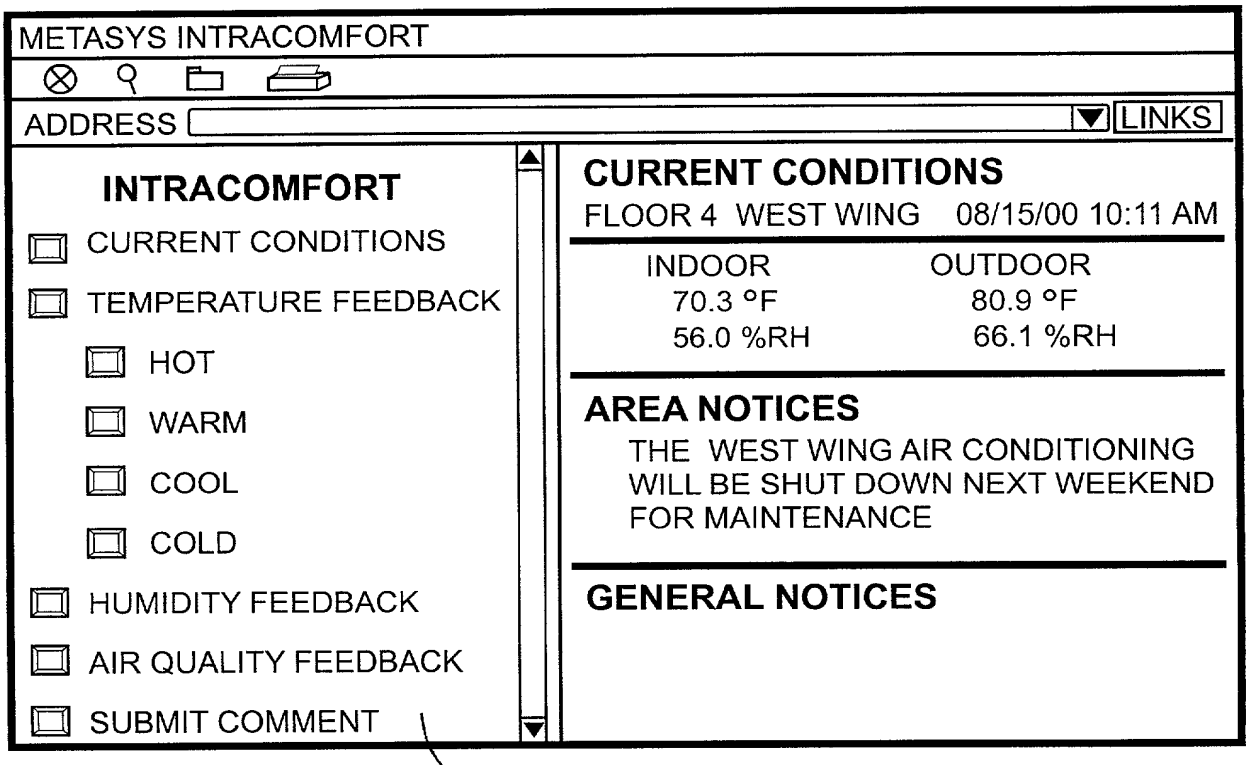

FIG. 3

Johnson Controls, Inc. 1999

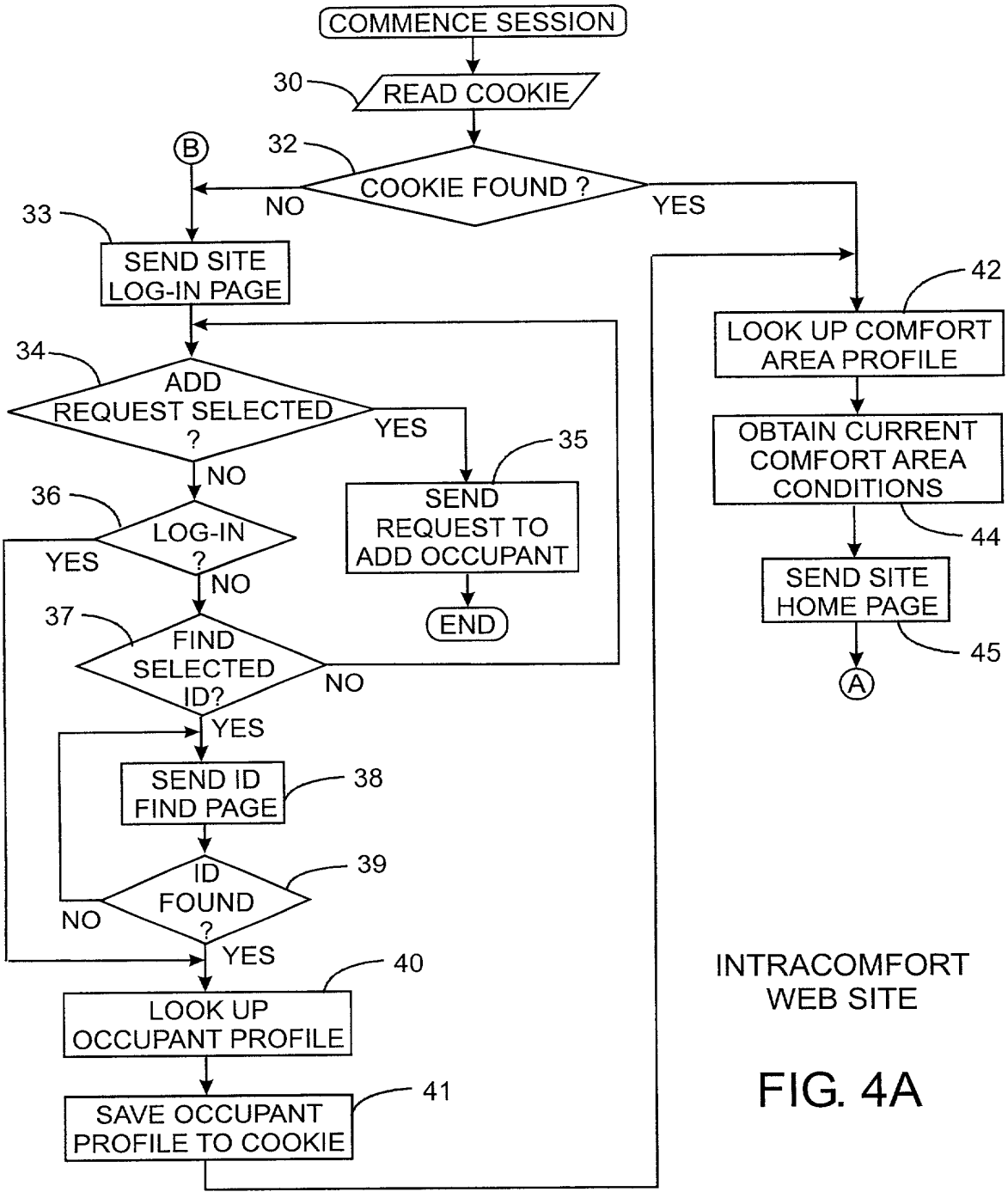

FIG. 4A

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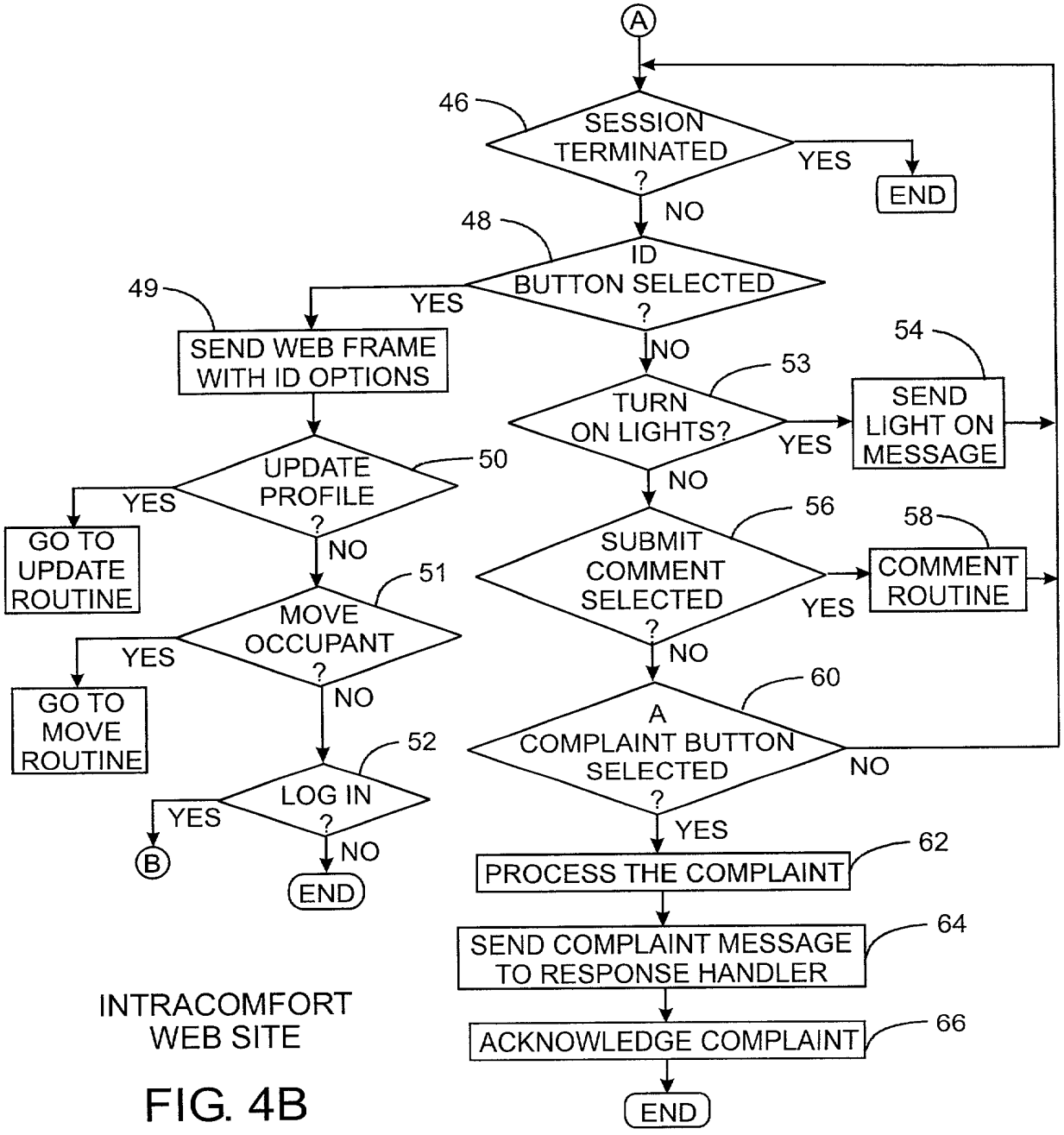

INTRACOMFORT WEB SITE

FIG. 4B

D0S0S0T: 3S6S7S5D

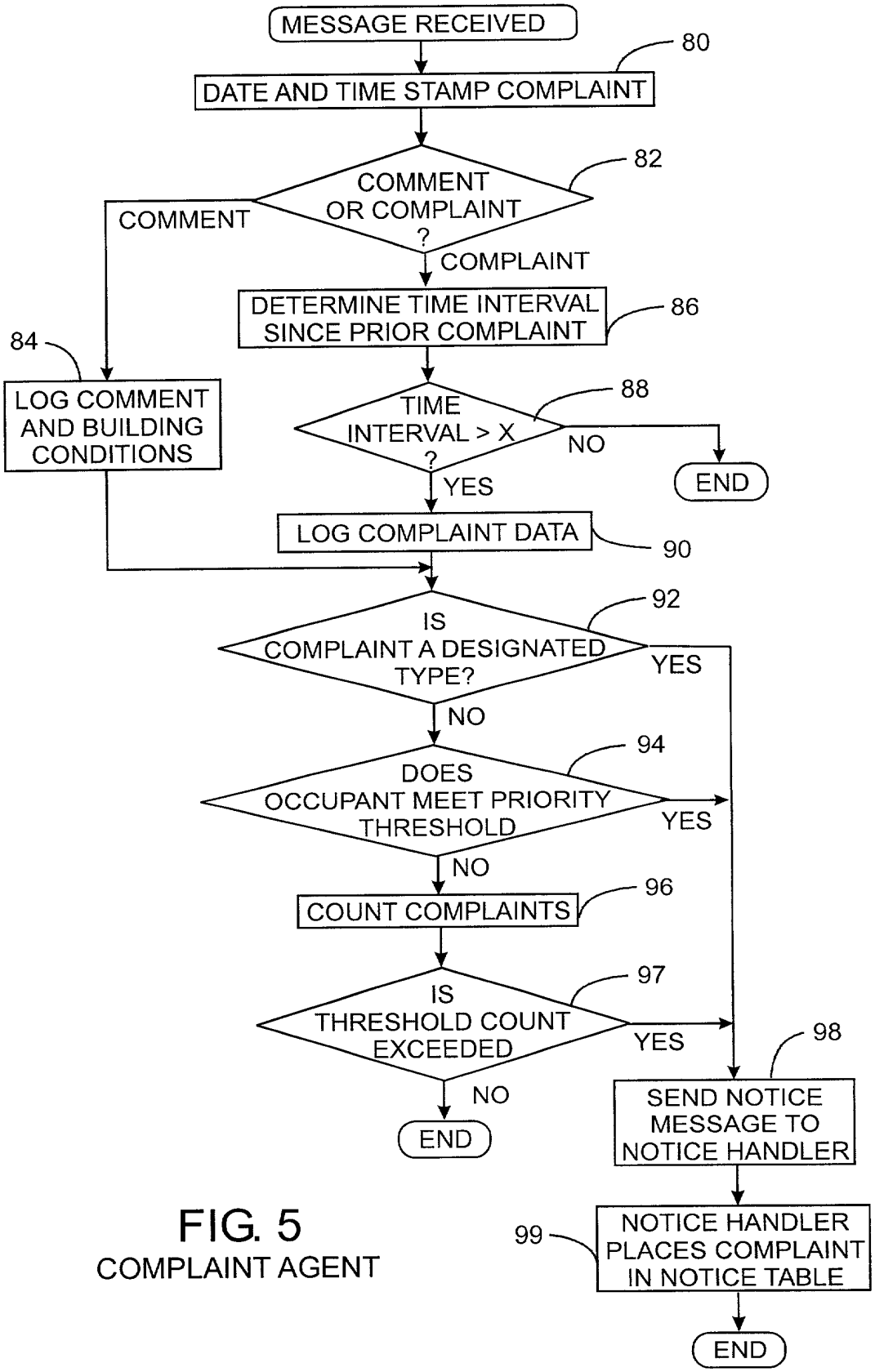

FIG. 5
COMPLAINT AGENT

US 6,604,682 B2

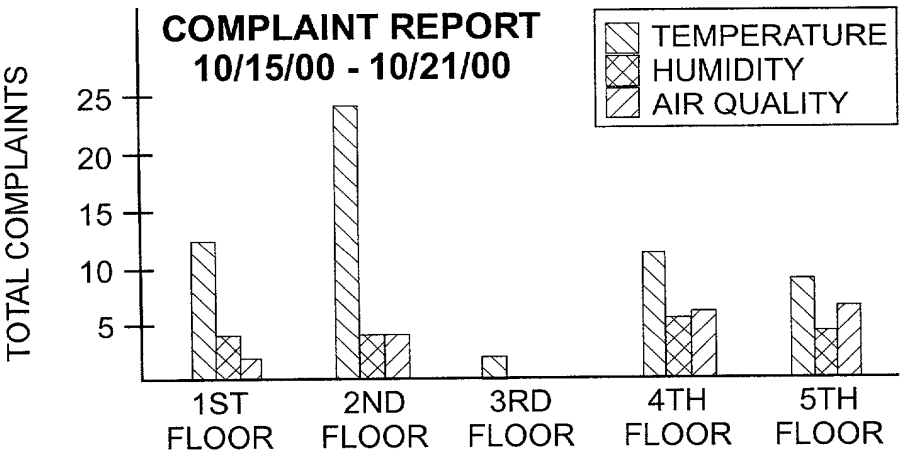

FIG. 6

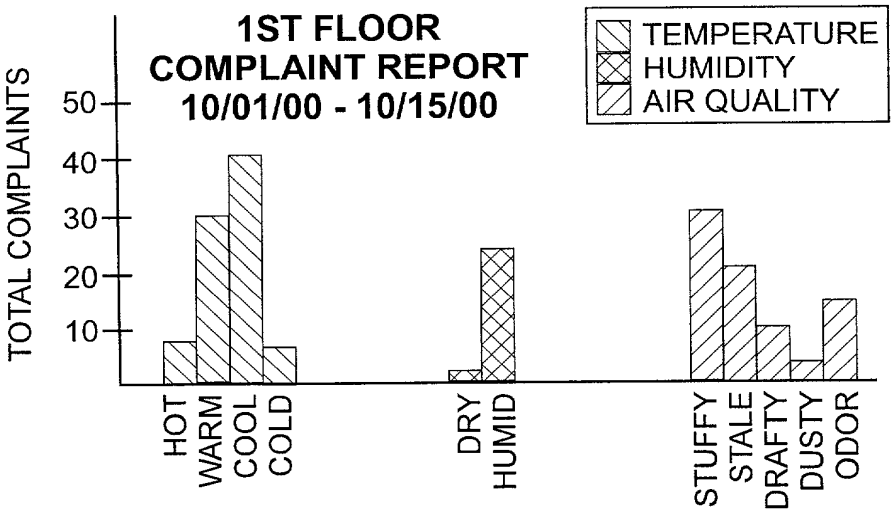

FIG. 7

COMPLAINT LOG

DATE & TIME	COMFORT AREA	COMPLAINT	OCCUPANT ID	AREA TEMP.	HUMIDITY	CO2	SETPOINT	DISCHARGE TEMP.
08/15/00 1:45 PM	FLOOR 4 WEST	HOT	BAKER, J.	79.0 °F	60% RH	500 PPM	76.0 °F	60.0 °F
08/15/00 1:40 PM	FLOOR 3 EAST	COOL	POND, J.	68.2 °F	62% RH	461 PPM	75.0 °F	55.0 °F
08/15/00 9:46 AM	FLOOR 1 LOBBY	HOT	THOMAS,K.	80.6 °F	60% RH	450 PPM	75.0 °F	51.0 °F
08/15/00 9:30 PM	FLOOR 3 EAST	HUMID	RADLER, D.	73.9 °F	76% RH	475 PPM	74.0 °F	54.0 °F
08/14/00 4:46 PM	FLOOR 4 WEST	HOT	BAKER, J.	78.8 °F	57% RH	488 PPM	76.0 °F	55.0 °F
08/14/00 2:16 PM	FLOOR 2 NORTH	COOL	FOX, A.	70.0 °F	61% RH	463 PPM	76.0 °F	55.0 °F
08/14/00 9:23 PM	FLOOR 1 EAST	DRAFTY	SWIFT, C.	72.9 °F	56% RH	495 PPM	73.0 °F	51.0 °F

FIG. 8

EXPRESS MAIL LABEL NO. EJ636885866US

PTO/SB/01 (6-95)
Approved for use through 9/30/98. OMB 0651-0032
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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0010/PTO Rev 6/95 — U.S. Department of Commerce Patent and Trademark Office

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION

[X] Declaration Submitted with Initial Filing OR [ ] Declaration Submitted after Initial Filing

Attorney Docket Number	510554.95181
First Named Inventor	Sheri Lee Meyer
COMPLETE IF KNOWN	
Application Number	Not yet assigned
Filing Date	Herewith
Group Art Unit	
Examiner Name	

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

SYSTEM FOR PROCESSING INTERIOR ENVIRONMENT COMPLAINTS FROM BUILDING OCCUPANTS

(Title of the Invention)

the specification of which

[X] is attached hereto

OR

[ ] was filed on (MM/DD/YYYY) _____ as United States Application Number or PCT International Application Number _____ and was amended on (MM/DD/YYYY) _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations §1.56

I hereby claim foreign priority benefits under Title 35, United States Code §119(a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate or §365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached? YES	NO
			[ ]	[ ]	[ ]
			[ ]	[ ]	[ ]
			[ ]	[ ]	[ ]
			[ ]	[ ]	[ ]
			[ ]	[ ]	[ ]
			[ ]	[ ]	[ ]

[ ] Additional foreign applications numbers are listed on a supplemental priority sheet attached hereto:

I hereby claim the benefit under Title 35, United States Code §119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)

[ ] Additional provisional application numbers are listed on a supplemental priority sheet attached hereto.

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Docket #95181

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DECLARATION

I hereby claim benefit under Title 35, United States Code §120 of any United States application(s), or §365(C) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application or PCT international application in the manner provided in the first paragraph of Title 35, United States Code §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application Number	PCT Parent Number	Parent Filing Date (MM/DD/YYYY)	Parent Patent Number *(if applicable)*

[ ] Additional U.S. or PCT international application numbers are listed on a supplemental priority sheet attached hereto

As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and all continuation and divisional applications based thereon, and to transact all business in the Patent and Trademark Office connected therewith:

[ ] Firm Name _____ Customer Number or label _____

OR

[X] List attorney(s) and/or agent(s) name and registration number below

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J. Rodman Steele	25,931	Mark D. Passler	40,764
Nicholas J. Seay	27,386	Stanley A. Kim	42,730
George E. Haas	27,642	Scott D. Paul	42,984
Michael J. McGovern	28,326	John T. Pienkos	42,997
Carl R. Schwartz	29,437	Daniel G. Radler	43,028
Gregory A. Nelson	30,577	Gregory M. Smith	43,136
Keith M. Baxter	31,233	Steven J. Wietrzny	44,402
John D. Franzini	31,356	Steven M. Greenberg	44,725
Joseph W. Bain	34,290	David M. Kettner	45,589
Robert J. Sacco	35,667	Adam J. Forman	P46,707
Jean C. Baker	35,433		
David G. Ryser	36,407		

[ ] Additional attorney(s) and/or agents named on a supplemental priority sheet attached hereto

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Country	USA	**Telephone**	414) 277-5000	**Fax**	(414) 271-3552

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

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Post Office							
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Applicant Authority: [ ]

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DECLARATION

ADDITIONAL INVENTOR(S)
Supplemental Sheet

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Inventor's Signature: | Date:

Residence: | State: | Country: | Citizenship:

Post Office:

Post Office:

City: | State: | Zip: | Country: | Applicant Authority:

Name of Additional Joint Inventor, if any | A petition has been filed for this unsigned inventor

Given Name	Middle Initial	Family Name	Suffix e.g. Jr.

Inventor's Signature: | Date:

Residence: | State: | Country: | Citizenship:

Post Office:

Post Office:

City: | State: | Zip: | Country: | Applicant Authority:

Name of Additional Joint Inventor, if any: | A petition has been filed for this unsigned inventor

Given Name	Middle Initial	Family Name	Suffix e.g. Jr.

Inventor's Signature: | Date:

Residence | State: | Country: | Citizenship:

Post Office:

Post Office:

City: | State: | Zip: | Country: | Applicant Authority:

Additional inventors are being named on supplemental sheet(s) attached hereto

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